CLAIMS

1. A method for limiting a signal in a transmitter at chip level, **characterized** by

(302) determining a limiting signal from a transmissible signal filtered using a pulse shaping filter,

(304) determining an error signal using the transmissible signal and the limiting signal,

(306) generating a limited transmissible signal by reducing an error signal filtered using the filter matched to a chip pulse waveform from the transmissible signal.

2. A method for limiting a signal in a transmitter at chip level, **characterized** by

(402) determining a limiting signal from a transmissible signal filtered using a pulse shaping filter,

(404) determining an error signal using the transmissible signal and the limiting signal,

(406) orthogonalizing the error signal filtered using the filter matched to a chip pulse waveform,

(408) generating a limited transmissible signal by reducing the orthogonalized error signal from the transmissible signal.

3. A method for limiting a signal in a transmitter at chip level, **characterized** by

(502) combining at least two signals modulated on different carriers to a combination signal,

(504) determining a limiting signal from the combination signal filtered using a pulse shaping filter,

(506) determining an error signal using the combination signal and the limiting signal,

(508) dividing the error signal onto different carriers in a predetermined manner,

(510) generating limited transmissible signals by reducing each error signal part filtered using the filter matched to a chip pulse waveform from a corresponding transmissible signal.

4. A method as claimed in claim 1, 2 or 3, **characterized** in that the transmissible signal is a baseband signal.

5. A method as claimed in claim 1 or 2, **characterized** in that the limiting signal is a baseband signal.

6. A method as claimed in claim 1 or 2, **characterized** in that the error signal is a baseband signal.

7. A method as claimed in claim 1, 2 or 3, **characterized** in that the limiting signal is determined by means of a threshold value set for the power or amplitude values.

8. A method as claimed in claim 1, 2 or 3, **characterized** in that the limiting signal is determined by means of a threshold value set for the power or amplitude values, the threshold value being set bearing in mind the maximum value predetermined for an error vector magnitude.

9. A method as claimed in claim 1, 2 or 3, **characterized** in that the limiting signal is determined by means of a threshold value set for the power or amplitude values, the threshold value being set bearing in mind the maximum value predetermined for a peak code domain error.

10. A method as claimed in claim 1, 2 or 3, **characterized** in that the limiting signal is determined by means of a threshold value set for the power or amplitude values, the threshold value being set so as to obtain the desired Peak-to-Mean Ratio, Peak-to-Average Ratio, Crest factor of the power or amplitude.

11. A method as claimed in claim 2, **characterized** in that a second clipping stage is added.

12. A method as claimed in claim 2, **characterized** in that orthogonalization is carried out by minimizing the equation

$$\left| \begin{bmatrix} x_1 & x_2 & \cdots & x_p \end{bmatrix} \begin{bmatrix} c_{1,1} & c_{2,1} & \cdots & c_{n,1} \\ c_{1,2} & c_{2,2} & \ddots & c_{n,2} \\ \vdots & \vdots & \ddots & \vdots \\ c_{1,p} & c_{2,p} & \cdots & c_{n,p} \end{bmatrix} - \begin{bmatrix} y_1 & y_2 & \cdots & y_n \end{bmatrix} \right| .$$

13. A method as claimed in claim 2, **characterized** in that unused codes are utilized in orthogonalization.

14. A method as claimed in claim 2, **characterized** in that codes used at a lower modulation level are utilized in orthogonalization.

15. A method as claimed in claim 2 or 3, **characterized** in that the orthogonalization of the error signal is carried out according to carriers.

16. A method as claimed in claim 3, **characterized** in that the error signal is divided equally between different carriers.

17. A method as claimed in claim 3, **characterized** in that the error signal is divided between different carriers in relation to the power or amplitude values to be clipped.

18. A transmitter limiting a signal at chip level, **characterized** in that

the transmitter comprises means (704) for determining a limiting signal from a transmissible signal filtered using a pulse shaping filter,

the transmitter comprises means (704, 710, 712) for determining an error signal using the transmissible signal and the limiting signal,

the transmitter comprises means (720) for generating a limited transmissible signal by reducing the error signal filtered using the filter matched to a chip pulse waveform from the transmissible signal,

the transmitter comprises means (722, 724) for filtering the limited transmissible signal using the pulse shaping filter.

19. A transmitter limiting a signal at chip level, **characterized** in that

the transmitter comprises means (804) for determining a first limiting signal from a transmissible signal filtered using a pulse shaping filter,

the transmitter comprises means (804, 806, 808) for determining a first error signal using the transmissible signal and the first limiting signal,

the transmitter comprises means (816) for orthogonalizing the first error signal filtered using the filter matched to a chip pulse waveform,

the transmitter comprises means (822) for generating a first limited transmissible signal by reducing the orthogonalized first error signal from the transmissible signal,

the transmitter comprises means (828) for determining a second limiting signal from the first limited transmissible signal filtered using the pulse shaping filter,

the transmitter comprises means (828, 832, 834) for determining a second error signal using the first limited transmissible signal and the second limiting signal,

the transmitter comprises means (842) for generating a second limited transmissible signal by reducing the second error signal filtered using the filter matched to a chip pulse waveform from the transmissible signal,

the transmitter comprises means (844, 846) for filtering the second limited transmissible signal using the pulse shaping filter.

20. A transmitter limiting a signal at chip level, **characterized** in that

the transmitter comprises means (912) for combining at least two signals modulated on different carriers to a combination signal,

the transmitter comprises means (914) for determining a limiting signal from the combination signal filtered using a pulse shaping filter,

the transmitter comprises means (914, 918, 920) for determining an error signal using the combination signal and the limiting signal,

the transmitter comprises means (922) for dividing the error signal onto different carriers in a predetermined manner,

the transmitter comprises means (938, 948) for generating limited transmissible signals by reducing each error signal part filtered using the filter matched to a chip pulse waveform from a corresponding transmissible signal,

the transmitter comprises means (940, 942, 950, 952) for filtering the limited transmissible signals using the pulse shaping filter,

the transmitter comprises means (954) for generating a combined limited transmissible signal by combining the filtered limited transmissible signals.

21. A transmitter limiting a signal at chip level, **characterized** in that

the transmitter comprises means (902, 906) for filtering transmissible signals modulated on different carriers using pulse shaping filters,

the transmitter comprises means (912) for combining at least two filtered signals to a combination signal.

the transmitter comprises means (914) for determining a limiting signal from the combination signal,

the transmitter comprises means (914, 918, 920) for determining an error signal using the combination signal and the limiting signal,

the transmitter comprises means (922) for dividing the error signal onto different carriers in a predetermined manner,

the transmitter comprises means (938, 948) for generating limited transmissible signals by reducing each error signal part filtered using the filter matched to a chip pulse waveform from a corresponding transmissible signal,

the transmitter comprises means (940, 942, 950, 952) for filtering the limited transmissible signals using the pulse shaping filter,

the transmitter comprises means (954) for generating a combined limited transmissible signal by combining the filtered limited transmissible signals.

22. A transmitter as claimed in claim 18, 19 or 20, **characterized** in that the transmissible signal is a baseband signal.

23. A transmitter as claimed in claim 18 or 19, **characterized** in that the limiting signal is a baseband signal.

24. A transmitter as claimed in claim 18 or 19, **characterized** in that the error signal is a baseband signal.

25. A transmitter as claimed in claim 18, 19 or 20, **characterized** in that the transmitter comprises the means (704, 804, 828, 914) for determining the limiting signal by means of a threshold value set for the power or amplitude values.

26. A transmitter as claimed in claim 18, 19 or 20, **characterized** in that the transmitter comprises the means (704, 804, 828, 914) for determining the limiting signal by means of a threshold value set for the power or amplitude values, the threshold value being set bearing in mind the maximum value predetermined for an error vector magnitude.

27. A transmitter as claimed in claim 18, 19 or 20, **characterized** in that the transmitter comprises the means (704, 804, 828, 914) for determining the limiting signal is determined by means of a threshold value set for the power or amplitude values, the threshold value being set bearing in mind the maximum value predetermined for a peak code domain error.

28. A transmitter as claimed in claim 18, 19 or 20, **characterized** in that the transmitter comprises the means (704, 804, 828, 914) for determining the limiting signal by means of a threshold value set for the power or amplitude values, the threshold value being set so as to obtain the desired Peak-to-Mean Ratio, Peak-to-Average Ratio, Crest factor of the power or amplitude.

29. A transmitter as claimed in claim 19 or 20, **characterized** in that the orthogonalization of the error signal is carried out according to carriers.

30. A transmitter as claimed in claim 20, **characterized** in that the transmitter comprises the means (922) for dividing the error signal equally between different carriers.

31. A transmitter as claimed in claim 20, **characterized** in that the transmitter comprises the means (922) for dividing the error signal between different carriers in relation to the power or amplitude values to be clipped.

32. A transmitter as claimed in claim 19, **characterized** in that the transmitter comprises the means (816) for carrying out orthogonalization by minimizing the equation

$$\left| \begin{bmatrix} x_1 & x_2 & \cdots & x_p \end{bmatrix} \begin{bmatrix} c_{1,1} & c_{2,1} & \cdots & c_{n,1} \\ c_{1,2} & c_{2,2} & \ddots & c_{n,2} \\ \vdots & \vdots & \ddots & \vdots \\ c_{1,p} & c_{2,p} & \cdots & c_{n,p} \end{bmatrix} - \begin{bmatrix} y_1 & y_2 & \cdots & y_n \end{bmatrix} \right|.$$

33. A transmitter as claimed in claim 19, **characterized** in that the transmitter comprises the means (816) for carrying out orthogonalization utilizing unused codes.

34. A transmitter as claimed in claim 19, **characterized** in that the transmitter comprises the means (816) for carrying out orthogonalization utilizing codes used at a lower modulation level.